

1.) What is the Big O of the following equation?

```
public int sqrt(int n) {
    for(int guess = 1; guess * guess <= n; guess++){
        if(guess * guess == n){
            return guess;
        }
    }
    return -1;
}
```

```
public interface Reservable { public int getNumSeats(); }
```

```
public abstract class Room {
    private String name;
    public Room(String n) { name = n; }
    public abstract boolean isWired();
    public String toString() { return "Room: " + name; }
}
```

```
public class Lab extends Room {
    private String systems;
    public Lab(String n, String s) {
        super(n);
        systems = s;
    }
    public String toString() { return "Lab: " + systems; }
    public boolean isWired() { return true; }
}
```

```
public class Office extends Room {
    public Office() { super("off"); }
    public boolean isWired() { return false; }
}
```

```
public class Classroom extends Room implements Reservable {
    private int seats;
    public Classroom(String n, int s) {
        super(n);
        seats = s;
    }
    public boolean isWired() { return false; }
    public int getNumSeats() { return seats; }
}
```

```
public class InstructionalLab extends Lab implements Reservable {
    public InstructionalLab() { super("teach", "dual"); }
    public int getNumSeats() { return 24; }
}
```

Given the above classes/interface, answer the following questions.

2.) Write "VALID" if code will compile without error, "INVALID" otherwise.

a.) `Object obj1 = new Room("Aud");`

b.) `Object obj2 = new InstructionalLab();`

c.) `Room r1 = new Classroom("4.813", 35);`

d.) `InstructionalLab b1 = new Lab("3rd floor", "BeBox");`

e.) `Reservable r2 = new Office("Grond");`

f.) `Reservable r3 = new InstructionalLab();`

3.) What is output by the following code?

a.) `Room r4 = new Lab("Dun", "Amiga");`
`System.out.print(r4);`

b.) `InstructionalLab b2 = new InstructionalLab();`
`System.out.print(b2.isWired() + " " + b2);`

c.) `Office o1 = new Office();`
`System.out.print(o1.isWired() + " " + o1);`

d.) `Room r5 = new Classroom("6.516", 16);`
`System.out.print(r5.isWired() + " " + r5.getNumSeats());`

4.) What is returned by the method call `a(13)`?

```
public static int a(int x) {  
    if (x == 0) {  
        return 0;  
    } else {  
        return x + a(x / 2);  
    }  
}
```

5.) What is returned by the method call `c(20)`?

```
public static int c(int n) {  
    if (n <= 0)  
        return 2;  
    else {  
        int t1 = c(n - 10);  
        int t2 = c(n - 5);  
        return 1 + t1 + t2;  
    }  
}
```

6.) What is output by the method call `g(7, -1)`?

```
public void g (int x, int y) {  
    if(x <= y)  
        System.out.print("!");  
    else {  
        System.out.print(x);  
        g(x - 1, y + 2);  
        System.out.print(y);  
    }  
}
```